



The Impact of Music on Short Term Memory and Cognitive Processes

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Study Overview

The present study sought to analyze the effects of background music on cognition (e.g., memorization, reading comprehension and pattern recognition) and which category of pop background music (instrumental pop, pop with both instrument and vocals, or pop with vocals only) may have the greatest impact on ones attention span and concentration, as operationalized through several memory and pattern recognition tasks.

The Impact of Music

Previous research on music and memory (Ho, Chi, Cheung, Chun, Chan, & Agne, 2003) has found that music has a positive impact on children's verbal but not visual memory. Children that were given music training showed a greater level of verbal memory than did their peers without such training. However, their visual memory remained relatively the same.

Research conducted by Salamé and Baddeley (1987) showed that instrumental and/or unattended vocal music both have an impact on short term memory (STM) performance. Vocal music was found to have a bigger impact on STM performance than did instrumental music. The research also found that both silence and unattended speech both have less disruptive effects on STM performance than does instrumental music.

A study conducted by Thompson, Schellenberg, and Letnic (2012) found that listening to background instrumental music has a disruptive effect on reading comprehension when the music is either loud and/or fast.

Research conducted by Schellenberg (2004) found that children in music groups had a greater increase in IQ after a music lesson than did their counterparts in the control group who received no such lesson. Although the effects were found to be small, it nevertheless generalized across different index scores, IQ subtests, and standardized tests.

Schellenberg (2006) found that listening to music in one's childhood has a positive impact on academic performance and IQ later in life. Although this association is small, it is nevertheless long lasting.

Research Questions

Research question 1: Will background music serve to distract participants when going through the word memorization task, as compared to the control group?

Research question 2: Will instrumental background music help or distract participants when going through the IQ and Essay comprehension tasks, as compared to the control group?

Methodology

This study was fully survey based. Per IRB approval, after reading the information sheet were given a survey packet containing all of the questionnaires that they were asked to complete. The survey packet itself was divided into three distinct category; a memorization section, a reading comprehension section, and an IQ questionnaire section. While the participants were completing the survey packet, pop music was being played in the background. For group A an instrumental only version of a "million years ago by Adele" was played as background music. For group B a vocal only version of the same song was played as background music. For group C a version of the song containing both instrument and vocal was played in the background. Group D was the control group – as such the survey packet was completed with no background music. The survey was considered fully complete once all of the questions had been completed.

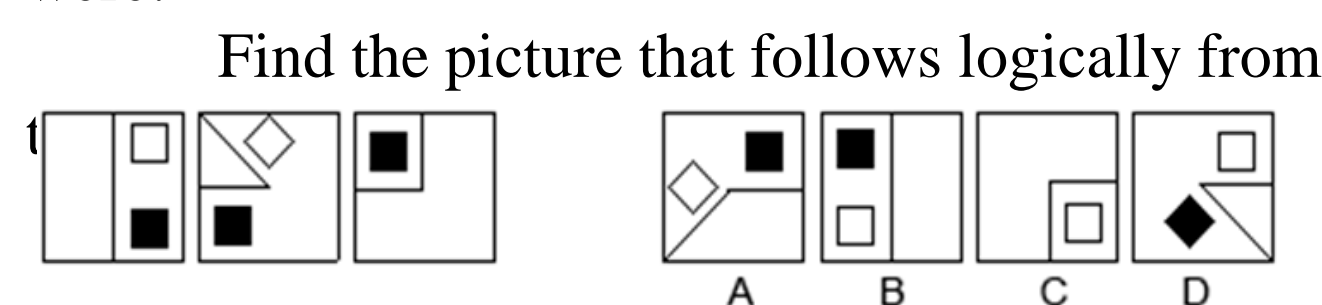
Instruments Used

The first part of the survey was a memorization quiz. A list of words were read to the participants—for the non-control group, music was played in the background—and after they were given 90 seconds to write down as many of those words that they remembered. Examples of those words were; father, wife, evergreen, university etc.

The second part of the survey was an essay based quiz. A Wikipedia based essay was given to the participants, who were given 3 minutes to read the essay in its entirety. A list of 8 questions, directly taken from the essay, was then presented to the participants. While answering the questions participants were asked to not refer back to the essay.

1. Who discovered the Island of Fogo?
A. Julio de Forestu.
B. Christopher Columbus
C. Vasco da Gama
D. António Noli

The final part of the survey was a pattern recognition styled IQ test. For this section of the survey, participants were given unlimited time to complete the 17 question IQ test. Examples of questions asked were:



What is the common pattern: 25, 23, 21, 19, 17, 15, 13
A. 3 B. 8 C. -3 D. -2 E. -8

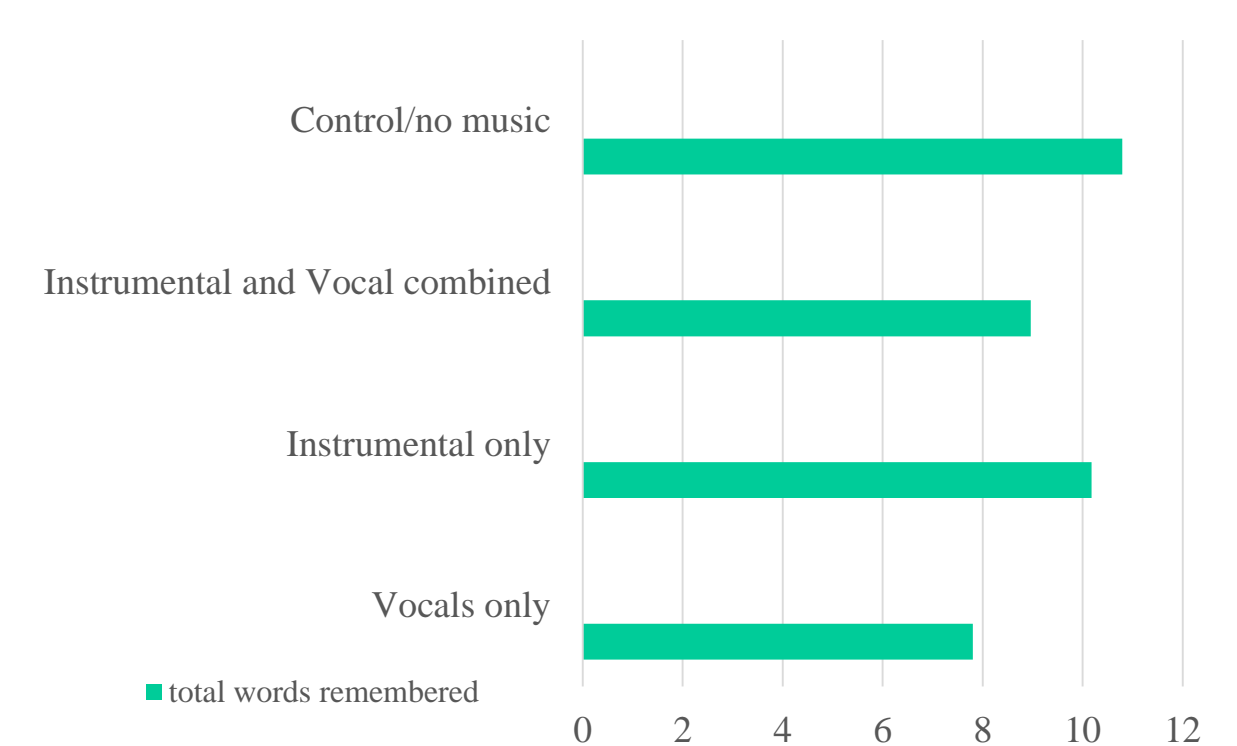
Participants

Participants were recruited from undergraduate courses at the University of Bridgeport. A total of 107 participants completed the survey, with ages ranging from 18-57 years. A total of 38 males and 68 females were in the sample, with one participant not disclosing their gender.

Results and Conclusions

Using ANOVA, several analyses were conducted to examine the stated research questions. First, an ANOVA was conducted to examine the impact of background music on the word memorization task. It was found that music significantly ($F(3,103) = 6.933, p < .001$) impacted the amount of words that participants were able to remember. Those in the control condition remembered the most words, with those in the vocal only condition remembering the least (see Figure 1). Importantly, there was very little difference between the instrumental only and control conditions.

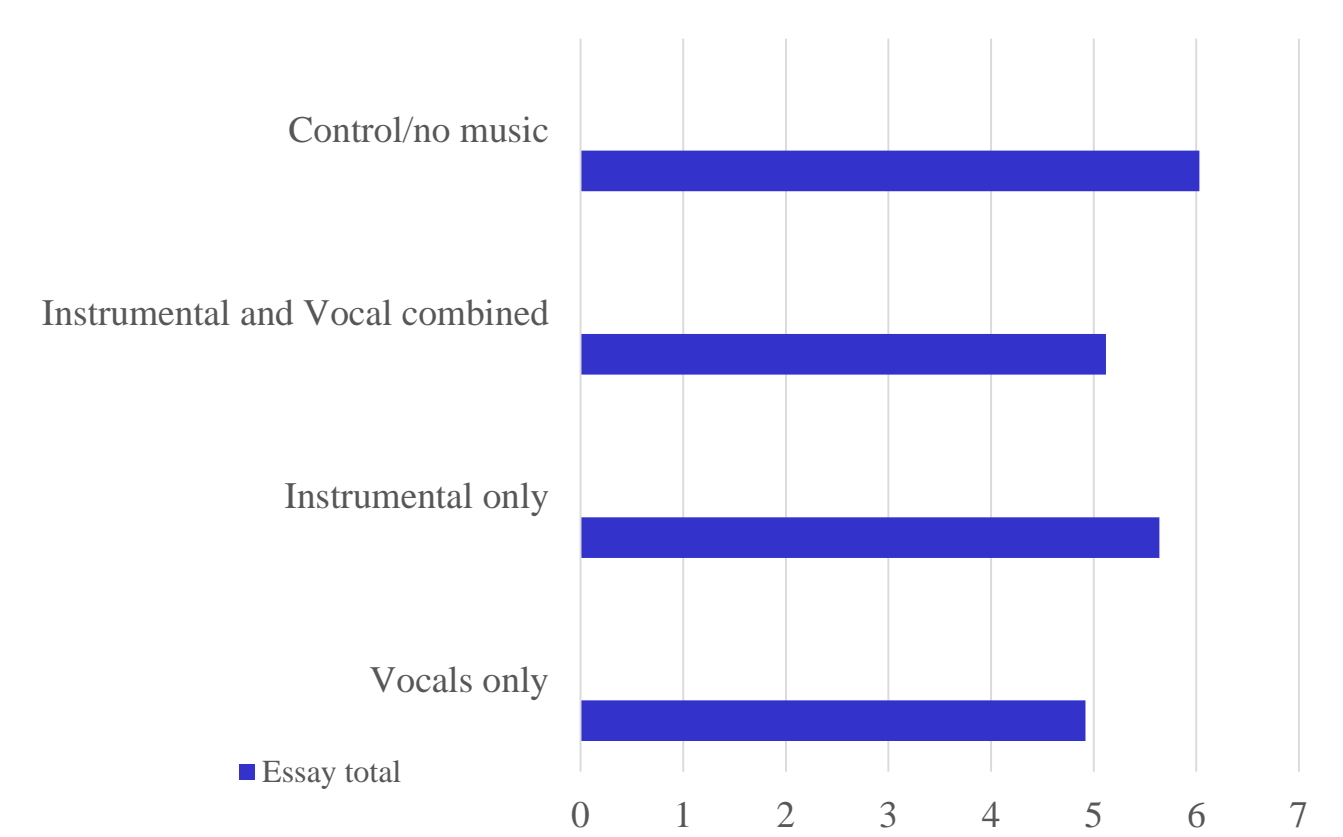
Figure 1. Impact of Music on Word Memory



An additional ANOVA was conducted to explore the impact of condition on the pattern recognition quiz. No significant impact was seen ($F(3,101) = 2.08, p = .11$).

Next, the impact of condition on the essay quiz was assessed via ANOVA. It was found that condition did significantly ($F(3,103) = 2.69, p = .05$) impact scores on this task. Participants in the control condition had the most correct responses, with those in the verbal only condition doing the worst (see Figure 2).

Figure 2. Impact of Music on Essay Recall



Conclusions

Given the present studies findings, several important conclusions can be reached. First, it is apparent that music does have an impact on memory and cognition, specifically that vocal music seems to interfere with memory storage, but not overall intelligence/problem solving (as operationalized via the pattern recognition IQ task). As this was not seen as strongly when vocal and instrumental music was combined (as is the case with most modern music), it may be the case that individuals attune to the words more when they are isolated, and that this increases interference in the processing of other language based memory processes. Further, very little difference was seen between the control condition and instrumental music alone, implying that music itself may not be that distracting, as long as language (vocals) is not present. Second, the present study suggests that students, while often using music as a background stimuli to their studies, may be negatively impacted by this music, unless they seek out music that is fully instrumental.

References:

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